DOCUMENT RESUME

ED 476 801 SE 067 862

TITLE	Get Cooking with Chemistry!
INSTITUTION	American Chemical Society, Washington, DC.
PUB DATE	2000-00-00
NOTE	9p.; Pictures may not photograph well.
AVAILABLE FROM	American Chemical Society, 1155 16th Street NW, Washington, DC 20036. Web site: http://www.acs.org.
PUB TYPE	Guides - Classroom - Teacher (052)
EDRS PRICE	EDRS Price MF01/PC01 Plus Postage.
DESCRIPTORS	*Chemical Reactions; *Chemistry; Elementary Education; *Science Activities; Science Instruction

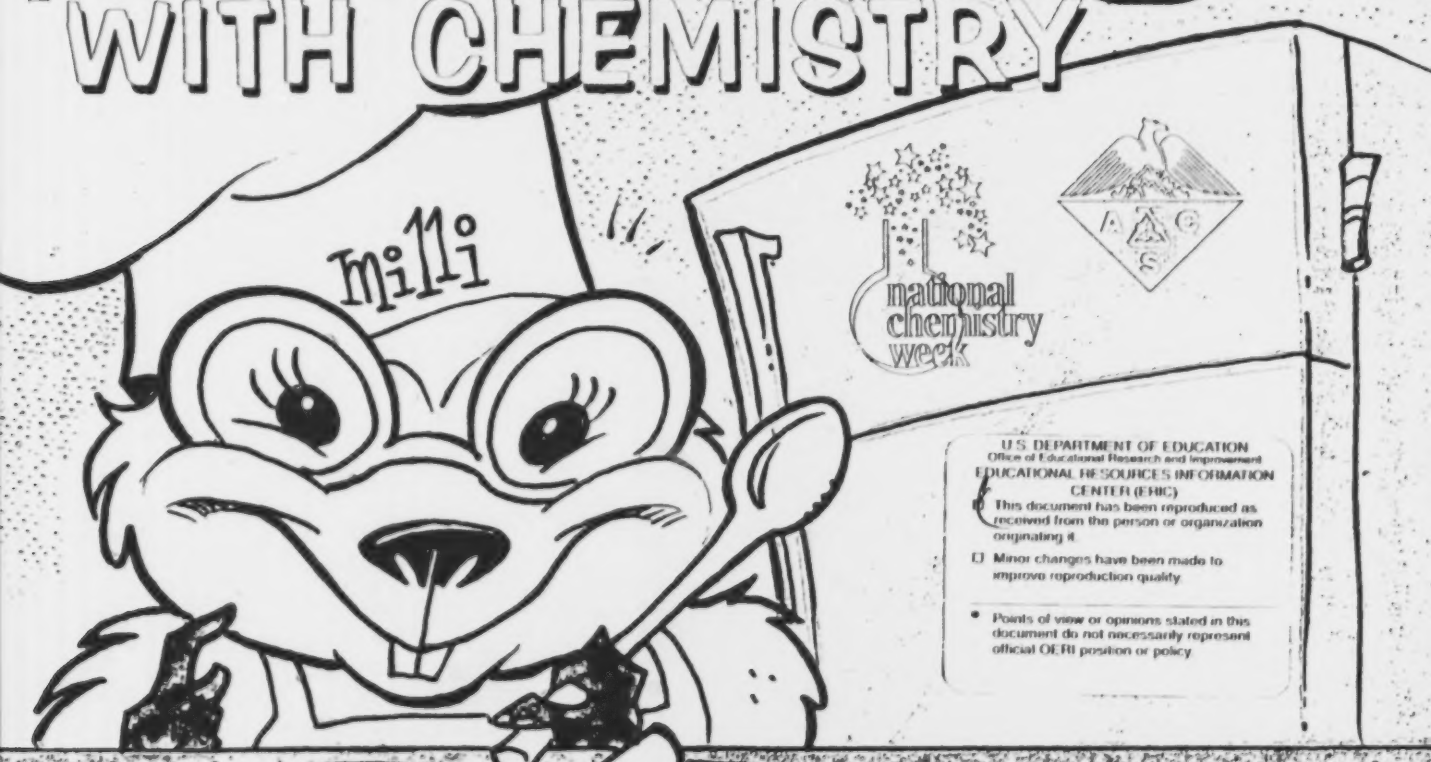
ABSTRACT

This book presents science activities investigating the chemical changes and reactions with powders that are used in baking. Activities include: (1) Mystery Powders; (2) Find the Fizz: Discover the Secret of Baking Powder; and (3) A Feast for Yeast and Cheese: Behold the Power of Chemistry. (YDS)

Reproductions supplied by EDRS are the best that can be made
from the original document.

ED 476 801

Get Cooking! WITH CHEMISTRY



U.S. DEPARTMENT OF EDUCATION
Office of Educational Research and Improvement
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)
This document has been reproduced as received from the person or organization originating it.
Minor changes have been made to improve reproduction quality.
Points of view or opinions stated in this document do not necessarily represent official OERI position or policy.

PERMISSION TO REPRODUCE AND DISSEMINATE THIS MATERIAL HAS BEEN GRANTED BY
T. Nannoff
TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)
1

BEST COPY AVAILABLE

D5067862

Mystery Powders

Chemistry is a science that deals with all the different kinds of matter in the universe. People who study chemistry try to figure out what the different solids, liquids, and gases that make up matter are made of. They also try to find out how these different kinds of matter can be put together, taken apart, and used to make other substances that help make our lives better.

For human beings and all other living things, a very important type of matter or substance is food. All living things need food to survive. Chemistry is very important when it comes to food.

Since everything you see, touch, taste, and smell is made of chemicals, food is made of chemicals, too. The mixing and cooking of ingredients to make food usually involve a chemical change or **chemical reaction.**

In the activities in this booklet, you will be the chemist! You will do chemical tests to identify some different powders used in baking. You will also mix ingredients and observe some of the chemical reactions that take place when certain foods are made. Be sure to have an adult helper present when you carry out these activities.

In this first activity, your job is to carry out chemical tests on certain powders used in cooking. After doing the tests, you will try to figure out the identity of a mystery powder!

YOU WILL NEED

2 sheets of paper	Water
Pencil	Tincture of iodine
Wax paper	Vinegar
Masking tape	Red cabbage
Baking powder	9 small plastic cups
Baking soda	4 droppers
Cornstarch	Zip-closing plastic bag
Cream of tartar	Measuring spoons

Preparation

1. The adult helper should carry out this step. Prepare the iodine solution by adding about 10 drops of tincture of iodine to 1 tablespoon of water.

CAUTION: Be very careful when using tincture of iodine. Read and follow all directions on the label.

2. With the assistance of an adult, prepare the red cabbage solution by tearing up 1 or 2 leaves of red cabbage. Place the pieces in a zip-closing plastic bag. Add about $\frac{3}{4}$ cup warm tap water. Seal the bag and squish the cabbage for about 3–5 minutes until the water turns a medium to dark blue.

3. Use masking tape and a pen to label 5 plastic cups, each with one of the following names: "baking powder", "baking soda", "cornstarch", "cream of tartar", and "mystery powder". Place 1 teaspoon of each of the first 4 powders into their labeled cups.

NOTE TO ADULT HELPER: Secretly select the mystery powder from one of the powders being used in the investigation and place 1 teaspoon of it in the cup labeled "mystery powder".

4. Now label 4 different cups, each with one of these names: "water", "iodine solution", "vinegar", and "red cabbage solution". Place about 2 teaspoons of each solution into its labeled cup.

BEST COPY AVAILABLE

Student Activity

1. Make 2 charts like the one shown here. Label one "Testing Chart" and the other one "Observation Chart". Cover your Testing Chart with a sheet of wax paper. Use masking tape to tape the wax paper down as shown.

2. On the Testing Chart, place about a $\frac{1}{8}$ teaspoon sample of baking powder in each of the 4 boxes under the "baking powder" column. Repeat this step for each of the other 3 powders so that you have 4 samples of each powder under each powder's name.

3. Use a dropper to place 4 or 5 drops of water on the baking powder sample in the row marked "water". Record your observations in the Observation Chart. Now add 4 or 5 drops of water to each of the other 3 powders along the row marked "water". Watch closely each time and write down your observations in the Observation Chart.

Testing Chart and Observation Chart

	Baking powder	Baking soda	Cornstarch	Cream of tartar	Mystery powder
Water					
Vinegar					
Iodine					
Red Cabbage					

4. Use a clean dropper to put 4 or 5 drops of vinegar on each powder along the row labeled "vinegar". Watch closely and write down your observations in the Observation Chart.

5. Repeat Step 4 using the iodine solution on each powder in the row labeled "iodine" and then use the red cabbage solution on each powder in the row labeled "red cabbage". Watch closely and write down your observations.

6. Now place a $\frac{1}{8}$ teaspoon sample of the mystery powder in each square under the "mystery powder" column. Use 4 or 5 drops of each liquid to test the mystery powder the way you tested the other powders. Based on your observations, what do you think the mystery powder is? Give some reasons that helped you make your decision.

7. Rinse the materials from the wax paper and the cups down the drain. Put the cups and wax paper in the trash. Wash your hands when you are finished.

Find the Fizz:

Discover the Secret of Baking Powder

When you did the mystery powder activity, you probably noticed that baking powder mixed with water made bubbles. Mixing baking powder and water causes a chemical reaction that produces a gas. Gas bubbles are an important part of making cakes, breads, muffins, and cookies. These baked foods are light and fluffy because of the gas bubbles produced when the ingredients are mixed and baked. Let's investigate ingredients that combine to make gas bubbles!

Hint #1: Baking powder is made of **baking soda** plus another ingredient.

Hint #2: The other secret ingredient is either flour, cornstarch, or cream of tartar.

YOU WILL NEED

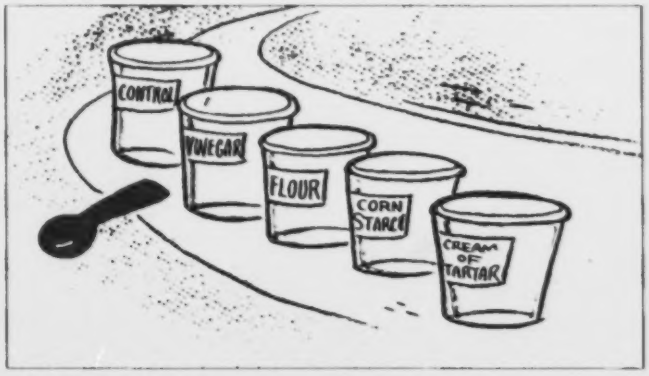
Vinegar	10 small plastic cups
Baking soda	5 pipettes
Baking powder	Masking tape
Cream of tartar	3 Popsicle sticks
Flour	Pen
Cornstarch	Measuring spoons
Red cabbage	

Prepare test solutions

1. Take 3 small cups and label each with one of the following names: "flour", "cornstarch", and "cream of tartar". Use masking tape and a pen to make the labels.

2. Add $\frac{1}{2}$ teaspoon each of flour, cornstarch, and cream of tartar to its labeled cup.

3. Add 2 teaspoons of water to each cup and stir each with a clean Popsicle stick.



Prepare indicator solution

4. Take 5 clean small cups. Using masking tape and a pen, label each cup with one of the following names: "control", "vinegar", "flour", "cornstarch", and "cream of tartar".

5. With the assistance of an adult, prepare the red cabbage indicator solution by tearing up 1 or 2 leaves of red cabbage. Place the pieces in a zip-closing plastic bag. Add about $\frac{3}{4}$ cup of warm water. Seal the bag and squish the cabbage for about 3–5 minutes until the water turns a medium to dark blue.

6. Place about 1 teaspoon of red cabbage indicator in each of the 5 cups.

Comparing white powders to vinegar

In the mystery powders activity, baking powder fizzed when you added water, and baking soda fizzed when you added vinegar. Remember, baking powder is made of baking soda plus another ingredient. When water is added, this other ingredient reacts with baking soda just like vinegar reacts with baking soda. Find out one thing the mystery ingredient has in common with vinegar.

7. Using a clean pipette, add 3 drops of vinegar to the indicator in the cup labeled "vinegar" and swirl carefully. What do you observe?

8. Using a clean pipette, add 3 or 4 drops of the flour solution to the indicator in the cup labeled "flour". Swirl carefully and observe.

9. Using a clean pipette, add 3 or 4 drops of the cornstarch solution to the indicator in the cup labeled "cornstarch". Swirl carefully and observe.

10. Using a clean pipette, add 3 or 4 drops of the cream of tartar solution to the indicator in the cup labeled "cream of tartar". Swirl carefully and observe.

11. Which of the three solutions, flour, cornstarch, or cream of tartar, gave a result similar to the result you saw with vinegar? What does this tell you about that substance?

Comparing baking soda and vinegar to the secret ingredients

12. Retest baking soda with vinegar. Place about 2 teaspoons of vinegar in a small plastic cup. Now add about $\frac{1}{2}$ teaspoon of baking soda and swirl. What do you observe?

13. If baking soda and vinegar cause fizzing, which powder might also fizz when mixed with baking soda and water? Let's try it! Add $\frac{1}{2}$ teaspoon of baking soda to the cream of tartar solution from step #3. What do you observe? Baking powder is probably made of baking soda and _____.

14. Dispose of all liquids down the drain. Place the cups in the trash. Wash your hands when you are finished.

BEST COPY AVAILABLE

A Feast for Yeast

Another popular gas bubble-maker is yeast. Unlike baking powder and baking soda, yeast is a living organism. Since yeast is alive, it needs water and food to grow. As yeast cells use their food, they give off a gas that makes bubbles. Find out what yeast cells like to eat by feeding them the ingredients in plain bread—water, flour, sugar, and salt.

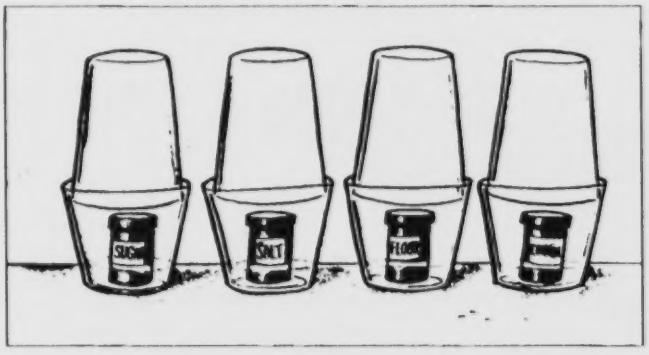
1. Use masking tape and a pen to label each of the 4 film canisters with one of the following names: "control", "sugar", "flour", and "salt". Add $\frac{1}{2}$ teaspoon each of sugar, flour, and salt to the properly labeled canisters.

2. Add $\frac{1}{2}$ teaspoon of yeast to each canister, including the control. Put the lids securely on the canisters and shake.

3. Add 2 tablespoons of hot tap water to each of the 4 short wide clear plastic cups.

4. Remove the lids from the film canisters and add 1 tablespoon of hot tap water to each. Place the lids on the canisters securely and shake them a couple of times to mix.

5. Stand each canister up in the water in a short wide cup. Be certain the canister remains standing. Place a tall clear plastic cup upside down over each of the short cups so the tall cup fits snugly inside the shorter cup. Watch and listen for the first cap to pop. You may have to wait 3–5 minutes. Which cap popped first? What ingredient does yeast most like to eat? Why do you think that?



6. Take the tops off each of the film canisters. Compare the control canister to the flour and salt canisters. What is a yeast cell's second favorite food? How do you know?

7. Dispose of the reaction mixtures down the drain, and put the rinsed film canisters and cups in the trash. Wash your hands when you are finished.

YOU WILL NEED

- 1 envelope of Rapid Rise yeast (7 grams)
- White all-purpose flour
- Sugar
- Salt
- Warm tap water (somewhere between 105 and 130 °F)
- 4 film canisters with lids
- 4 short wide 9-ounce clear plastic cups
- 4 tall 10-ounce clear plastic cups
- Masking tape
- Pen
- Measuring spoons

Cheese:

Behold the Power of Chemistry!

You couldn't have cheese without chemistry. Try this experiment to get an idea of how cheese is made.

After you prepare the cheese, **do not eat** your product. Before cheese is sent to the store for us to buy and eat, it undergoes a series of treatments that make it safe to eat.

1. Add 1 teaspoon of cream of tartar and 1 tablespoon of vinegar to one of the small cups. Stir until the powder is dissolved.

2. In another cup, add 2 tablespoons of fresh milk. You may use 2 tablespoons of water and 1 teaspoon of dry milk instead.

3. Pour the cream of tartar and vinegar solution

into the cup of milk and stir. Describe how your milk changed.

4. Place the coffee filter in an empty small cup. Pour the solids (curds) and liquid (whey) into the filter. Wait for as much liquid as possible to drain into the cup.

5. Gently squeeze the remaining liquid out of the filter.

6. Open the filter and put the curds into one of the cups. Reach into the cup and feel the curds. What do the curds feel like? You just made cheese! Be sure to wash your hands when you finish.

7. Dispose of all liquids down the drain. Put the cheese and cups in the trash. Wash your hands when you are finished.

REMEMBER: Do not taste the cheese you just made.

Cheese is made by adding either an acid, microorganisms, or enzymes to milk. Behold the power of chemistry!

YOU WILL NEED

- Vinegar
- Cream of tartar
- Water
- Milk (You can use dry milk and water instead of milk.)
- 3 small cups
- Small coffee filter (No. 1 Melitta®)
- Popsicle stick
- Measuring spoons

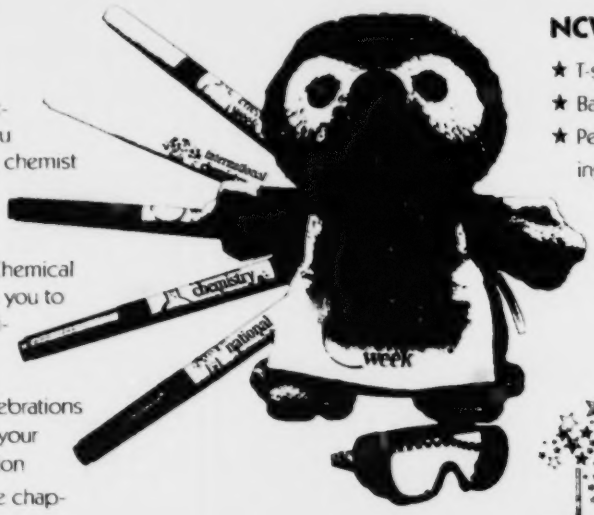
BEST COPY AVAILABLE

Join Us! For National Chemistry Week!

November 5-11, 2000

Calling all chemists:

Step into the spotlight and show you are proud to be a chemist during National Chemistry Week 2000, a program of the American Chemical Society! We invite you to initiate and participate in:



- ★ Events and celebrations sponsored by your ACS local section
- ★ Student affiliate chapter activities
- ★ Activities in elementary and secondary schools and universities
- ★ Demonstrations and hands-on activities for the entire family—pre-schoolers through senior citizens

NCW products will help you!

- ★ T-shirts galore!
- ★ Balloons
- ★ Pencils, thermochromic pens & color-changing markers
- ★ Milli Mole
- ★ Periodic Table Wallet cards

national chemistry week

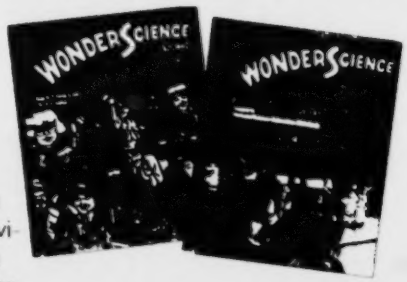
The theme for National Chemistry Week 2000 is "Kitchen Chemistry"

Join with chemists across the country as they share the chemical story of what really happens in the kitchen! Share the celebration with your students, co-workers, and friends.

For products and more information call us at 1-800-ACS-5558 or visit our Web site and online store (www.acs.org/ncw).

The Best of WonderScience Books

15 Years of WonderScience activities in Two Full-Color Books!

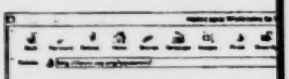


These indispensible source books offer a wealth of hands-on activities. Both books contain science background information and explanations of how activities support National Science Education Standards.

Best of WonderScience Volume I
65 Topics—More than 400 activities, $39.95

Best of WonderScience, Volume II
32 Topics—more than 200 activities, $29.95—available Fall 2000

You can buy both books for $49.95.

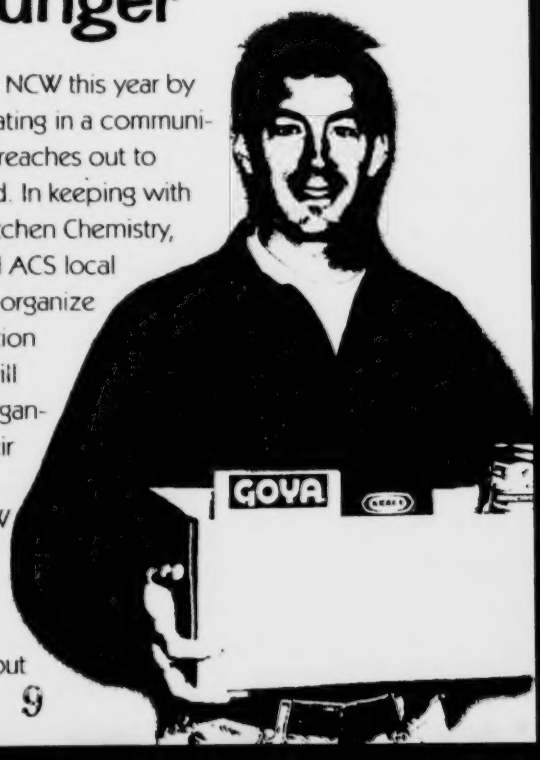


Visit our Web site at www.acs.org/wondernet for more hands-on science activities. Wondernet — Your Science Place in CyberSpace

National Chemistry Week 2000
Kitchen Chemistry Unifying Event

Chemists Reacting to Hunger

Celebrate NCW this year by participating in a community event that reaches out to those in need. In keeping with the theme Kitchen Chemistry, chemists and ACS local sections will organize food collection drives that will benefit an organization in their community. Visit the NCW Web site, **www.acs.org/ncw**, to tell us about your event.



3E067862

U.S. Department of Education
Office of Educational Research and Improvement (OERI)
National Library of Education (NLE)
Educational Resources Information Center (ERIC)

REPRODUCTION RELEASE

(Specific Document)

I. DOCUMENT IDENTIFICATION:

Title: Get Cooking with Chemistry!	
Author(s): American Chemical Society	
Corporate Source: American Chemical Society	Publication Date: 2000

II. REPRODUCTION RELEASE:

In order to disseminate as widely as possible timely and significant materials of interest to the educational community, documents announced in the monthly abstract journal of the ERIC system, *Resources in Education* (RIE), are usually made available to users in microfiche, reproduced paper copy, and electronic media, and sold through the ERIC Document Reproduction Service (EDRS). Credit is given to the source of each document, and, if reproduction release is granted, one of the following notices is affixed to the document.

If permission is granted to reproduce and disseminate the identified document, please CHECK ONE of the following three options and sign at the bottom of the page.

The sample sticker shown below will be affixed to all Level 1 documents	The sample sticker shown below will be affixed to all Level 2A documents	The sample sticker shown below will be affixed to all Level 2B documents
PERMISSION TO REPRODUCE AND DISSEMINATE THIS MATERIAL HAS BEEN GRANTED BY Sample TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC) 1	PERMISSION TO REPRODUCE AND DISSEMINATE THIS MATERIAL IN MICROFICHE, AND IN ELECTRONIC MEDIA FOR ERIC COLLECTION SUBSCRIBERS ONLY, HAS BEEN GRANTED BY Sample TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC) 2A	PERMISSION TO REPRODUCE AND DISSEMINATE THIS MATERIAL IN MICROFICHE ONLY HAS BEEN GRANTED BY Sample TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC) 2B
Level 1	Level 2A	Level 2B
X Check here for Level 1 release, permitting reproduction and dissemination in microfiche or other ERIC archival media (e.g., electronic) and paper copy.	Check here for Level 2A release, permitting reproduction and dissemination in microfiche and in electronic media for ERIC archival collection subscribers only	Check here for Level 2B release, permitting reproduction and dissemination in microfiche only

Documents will be processed as indicated provided reproduction quality permits.
If permission to reproduce is granted, but no box is checked, documents will be processed at Level 1.

I hereby grant to the Educational Resources Information Center (ERIC) nonexclusive permission to reproduce and disseminate this document as indicated above. Reproduction from the ERIC microfiche or electronic media by persons other than ERIC employees and its system contractors requires permission from the copyright holder. Exception is made for non-profit reproduction by libraries and other service agencies to satisfy information needs of educators in response to discrete inquiries.

Signature: Tamara Nameroff	Printed Name/Position/Title: Tamara Nameroff Assistant Director	
Organization/Address: American Chemical Society 1155 - 16th St, NW Washington, DC 20036	Telephone: 202 872 4523	FAX: 202 872 3048
	E-Mail Address: t-nameroff@acs.org	Date: 5/2/03

III. DOCUMENT AVAILABILITY INFORMATION (FROM NON-ERIC SOURCE):

If permission to reproduce is not granted to ERIC, or, if you wish ERIC to cite the availability of the document from another source, please provide the following information regarding the availability of the document. (ERIC will not announce a document unless it is publicly available, and a dependable source can be specified. Contributors should also be aware that ERIC selection criteria are significantly more stringent for documents that cannot be made available through EDRS.)

Publisher/Distributor:	American Chemical Society
Address:	Office of Society Services 1155 16th Street, NW Washington, DC 20036
Price:	

IV. REFERRAL OF ERIC TO COPYRIGHT/REPRODUCTION RIGHTS HOLDER:

If the right to grant this reproduction release is held by someone other than the addressee, please provide the appropriate name and address:

Name:	
Address:	

V. WHERE TO SEND THIS FORM:

Send this form to the following ERIC Clearinghouse:

However, if solicited by the ERIC Facility, or if making an unsolicited contribution to ERIC, return this form (and the document being contributed) to:

ERIC Processing and Reference Facility
4483-A Forbes Boulevard
Lanham, Maryland 20706

Telephone: 301-552-4200
Toll Free: 800-799-3742
FAX: 301-552-4700
e-mail: ericfac@inet.ed.gov
WWW: http://ericfacility.org